

The background of the slide is a deep space scene. In the upper left, a large, detailed Earth is visible, showing blue oceans and white clouds. To the right, a large, glowing purple nebula with intricate filamentary structures fills a significant portion of the upper right. In the lower right, four blue and orange spacecraft are shown in formation, appearing to fly towards the viewer. The rest of the background is a dark void filled with numerous small, distant stars.

# ***Reference Mission Configuration and Cooler Update***

**Govind Gadwal  
(Jean Grady presenting)**



## Reference Configuration Update

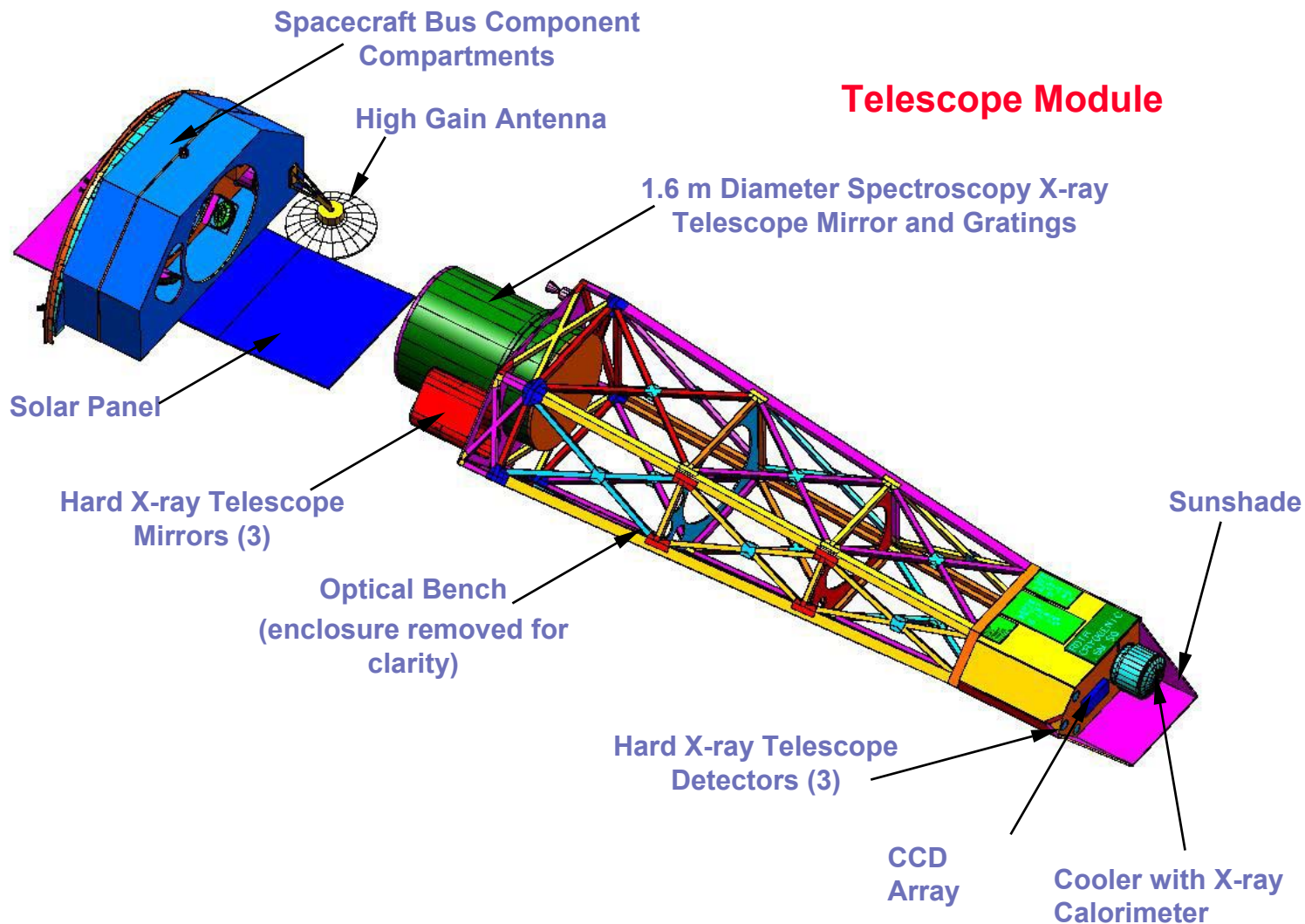
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- **Continued to Refine Fixed Bench Configuration**
  - Stiffened the optical bench by increasing the number of sections in the truss
  - Provided short stiff section near the optics
  - Light weighted the optical bench by changing its shape to pentagon from hexagon
- **Update Mass Estimates**
  - Light weighted the launch vehicle adapter interface
  - Light weighted the fixed bench
  - Adjusted the mass of HXT optics



# On-Orbit Configuration

## Spacecraft Bus





## Resource Summaries

### ■ Mass Estimate

| Item                     | Satellite Mass (Kg) | Launch Mass (Kg)  |
|--------------------------|---------------------|-------------------|
| Instrument Module        | 1561                | 3122              |
| Wet Spacecraft Bus       | 901                 | 1802              |
| Margin                   |                     | <u>1226</u> (25%) |
| <b>Total Launch Mass</b> |                     | <b>6150</b>       |

**Estimated Atlas V-551 Net  
Launch Capability C3 = -2.6**

**6150**

### ■ Power Estimate Per Satellite

|                                     |            |
|-------------------------------------|------------|
| Average Satellite Power Requirement | 814 Watts  |
| End of Life Power Capability        | 1100 Watts |

### ■ Telemetry Estimate per Satellite

|  |            |
|--|------------|
| S-Band Telemetry (Housekeeping Data)   | 2 Kbps     |
| X-Band Telemetry (Science Data)        | 1.7 Mbps   |
| Telemetry Down Link Time Approximately | 1 hour/day |



## Instrument Module Mass Summary

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### Description

### Mass (kg)

**SXT Mirror with Grating**

**753**

**CCD**

**20**

**HXT (Optics and Detectors)**

**195**

**Calorimeter with ADR**

**33**

**Cryosystem**

**90**

**Fixed Optical Bench**

**470**

**Total Instrument Module**

**1561**



## Spacecraft Bus Mass Summary

| <u>Description</u>          | <u>Mass (kg)</u> |
|-----------------------------|------------------|
| Structure                   | 302              |
| Mechanism                   | 7                |
| Power                       | 122              |
| Thermal                     | 17               |
| Propulsion Hardware         | 35               |
| Attitude Control            | 73               |
| C&DH                        | 7                |
| Communication               | 38               |
| Integration Materials       | 120              |
| Propellant                  | <u>180</u>       |
| <b>Spacecraft Bus Total</b> | <b>901</b>       |



# **Advanced Cryocooler Technology Development Program (ACTDP)**

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- **NASA HQ has initiated common Cryocooler technology development for Constellation-X, NGST, and TPF through the TPF project at JPL.**
- **The procurement begins in FY 2002 and ends in FY 2005. It has two phases:**
  - **Six months of Study phase**
  - **Remainder in Demonstration phase**
- **There will be two to three Engineering Models that will be developed through TRL-5 level.**
- **Constellation-X plans to fund Engineering Model in FY2005 and FY2006 to develop it through TRL-6 level.**
- **The procurement with participation of TPF, Constellation-X, and NGST is on fast track.**
  - **ACTDP Technology Announcement — December 4, 2001**
  - **Proposals due — January 18, 2002**
  - **Award with Letter of Intent — February 28, 2002**





## Cryosystem Trade Study

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- A study to investigate various Cryosystem configurations began on June 2001.
- The detector cooling requirements for TES and NTD Calorimeters were obtained by detailed analysis.
- Ten cryoconfigurations were listed to meet the requirements.
- Three configurations were selected for further conceptual design and study.
  - Mechanical Cooler system without stored cryogens
  - Cryosystem such as XRS with only stored cryogens
  - Hybrid system with Mechanical cooler and stored cryogens
- Preliminary indications are that the Hybrid System is presently at TRL-6 and will meet Constellation-X requirements with moderate mass and size impact.